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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 10/755,603
Filing Date: January 12, 2004
Appellant(s): HOSUR ET AL.

J. Joel Justiss
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/19/2007 appealing from the Office action

mailed 07/13/2007.

(1)　Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2)　Related Appeals and Interferences

The examiner is not aware of any related appeals, interference, or judicial

proceedings which will directly affect or be directly affected by or have a bearing on the

Board's decision in the pending appeal.

(3)　Status of Claims

The appellant's statement of the status of amendments after final rejection

contained in the brief is correct.

(4)　Status of Amendment After Final

No amendment after final has been filed.

(5)　Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6)   Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is

correct.

(7)   Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8)   Evidence Relied Upon

2004/0136464	Suh et al.	12-2003
2002/0057750	Nakao	11-2001
7,110,350 B2	Li et al.	06-2003

(9)   Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

1.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of
making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the
art to which it pertains, or with which it is most nearly connected, to make and use the same and shall
set forth the best mode contemplated by the inventor of carrying out his invention.

2.   Claims 1-3,5-6,9-11,13-14,17-19, and 21-22 are rejected under 35 U.S.C. 112,

first paragraph, as failing to comply with the written description requirement. The

claim(s) contains subject matter which was not described in the specification in such a

way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the

time the application was filed, had possession of the claimed invention. Regarding

claims 1,9,and 17, there is no mention of "wherein at least one of said first preamble

and said second preamble employs a complete or an undivided training sequence".

Regarding claims 2-3,5-6,10-11,18-19, and 21-22, there is no mention of "complete or

undivided training sequence".

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1-3,7-11,15, and 16 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Suh et al. (US Patent Application Publication #2004/0136464).

Regarding claim 1, as best understood in 112 1ˢᵗ paragraph, Suh teaches a

time-switched preamble generator for use with a multiple-input, multiple-output (MIMO)

transmitter employing first and second transmit antennas (Figure 5, first and second

transmit antennas are 527 and 539), comprising:

an initial preamble formatter configured to provide a first preamble to said first transmit antenna *(Claim 7, Suh teaches generating a first preamble sequence in which odd data of the preamble sequence becomes null data and even data of the preamble sequence becomes data, the first preamble sequence being adapted to be transmitted via the first of the two antennas for one OFDM symbol period)* and a second preamble to said second transmit antenna during an initial time interval *(Claim 7, Suh teaches generating a second preamble sequence in which the even data of the preamble sequence becomes null data and the odd data of the preamble sequence becomes data, the second preamble sequence being adapted to be transmitted via the second of the two antennas for the one OFDM symbol period)*; and

a subsequent preamble formatter coupled to said initial preamble formatter and configured to provide said second preamble to said first transmit antenna *(Claim 7, Suh teaches generating the first preamble sequence in which odd data of the preamble sequence becomes null data and even data of the preamble sequence becomes data, the first preamble sequence being adapted to be transmitted via the second of the two antennas for a next OFDM symbol period after passage of the one OFDM symbol period)* and said first preamble to said second transmit antenna during a subsequent time interval *(Claim 7, Suh teaches generating the second preamble sequence in which the even data of the preamble sequence becomes null data and the odd data of the preamble sequence becomes data, the second preamble sequence being adapted to be transmitted via the first of the two antennas for the next OFDM symbol period), except*

for wherein at least one of said first preamble and said second preamble employs a
complete training sequence.

However, in same art, Suh teaches wherein at least one of said first preamble and
said second preamble employs a complete training sequence (Paragraphs 0062-
0070).

Therefore, it would have been obvious to one of ordinary skill in the art at the
time of the invention was made to use the above teaching of Suh, in order to provide
both increased robustness and capacity.

Regarding claim 2, as best understood in 112 1st paragraph, Suh teaches the
generator wherein said first preamble employs <u>said complete</u> training sequence and
said second preamble employs a null *(Claim 7; Paragraphs 0062-0070,0076: Suh
teaches a preamble sequence generator 517 generates a corresponding preamble
sequence and provides the generates preamble sequence (complete training sequence)
to the selector 519).*

Regarding claim 3, as best understood in 112 1st paragraph, Suh teaches the
generator wherein said <u>complete</u> training sequence occurs during said null *(Claim 7;
Paragraphs 0037- 0038,0062-0070,0076).*

Regarding claim 7, Suh teaches the generator wherein at least one of said first
and second preambles employs a guard interval (Paragraphs 0010, 0013,0078, and
0087).

Regarding claim 8, Suh teaches the generator wherein said initial and
subsequent time intervals are contiguous (Claim 7).

5.   Claims 9-16 are rejected for the same reason as set forth in claims 1-8 and claim

18-24 are rejected for the same reason as set forth in claims 2-8.

6.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suh et al.

(US Patent Application Publication #2004/0136464) in view of Nakao et al. (US Patent

Application Publication #2002/0057750).

      Regarding claim 4, Suh teaches the generator wherein said null is selected from

the group consisting of: a null sequence; a zero function (Paragraphs 0037 and 0078),

except for an un-modulated transmission.

      However, in related art, Nakao teaches the generator wherein said null is

selected from the group consisting of: an un-modulated transmission (Paragraph 0011).

      Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention to provide the above teaching of Nakao to Suh for the synchronism

processor 8 is capable of detecting a synchronism timing by detecting the level of NULL

symbols (Nakao, Paragraph 0011).

7.   Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Suh et al. (US Patent Application Publication #2004/0136464) in view of Li et al. (US

Patent #7,110,350).

Regarding claim 5, as best understood in 112 1st paragraph, Suh teaches all
the claimed elements in claim 1, except for the generator wherein said first preamble
employs a complete first training sequence and said second preamble employs a
complete second training sequence orthogonal to said complete first training sequence.

However, in related art, Li teaches the generator wherein said first preamble
employs a complete first training sequence and said second preamble employs a
complete second training sequence orthogonal to said complete first training sequence
(See claim 10; Paragraphs 0062-0072).

Therefore, it would have been obvious to one of ordinary skill in the art at the
time of the invention was made to use the above teaching of Li to Suh in order to
achieve higher data transmission rates for wireless communication systems over
multipath-rich wireless channels (Li, Col 1, lines 55-59).

Regarding claim 6, as best understood in 112 1st paragraph, the combination
of Suh and Li teach all the claimed elements in claim 5. In addition, Li teaches the
generator wherein said complete first training sequence employs a subset of tones and
said <u>complete</u> second training sequence employs a remaining subset of tones (Col 5,
lines 18-38).

Regarding claim 17, as best understood in 112 1st paragraph, Suh teaches a
multiple-input, multiple-output (MIMO) communication system, comprising:

first and second transmitters employing first and second transmit antennas,
respectively (Figure 5, first and second transmit antennas are 527 and 539);

a time-switched preamble generator coupled to said first and second transmitters, including:

an initial preamble formatter that provides a first preamble to said first transmit antenna *(Claim 7, Suh teaches generating a first preamble sequence in which odd data of the preamble sequence becomes null data and even data of the preamble sequence becomes data, the first preamble sequence being adapted to be transmitted via the first of the two antennas for one OFDM symbol period)* and a second preamble to said second transmit antenna during an initial time interval *(Claim 7, Suh teaches generating a second preamble sequence in which the even data of the preamble sequence becomes null data and the odd data of the preamble sequence becomes data, the second preamble sequence being adapted to be transmitted via the second of the two antennas for the one OFDM symbol period)*, and

a subsequent preamble formatter coupled to said initial preamble formatter that provides said second preamble to said first transmit antenna *(Claim 7, Suh teaches generating the first preamble sequence in which odd data of the preamble sequence becomes null data and even data of the preamble sequence becomes data, the first preamble sequence being adapted to be transmitted via the second of the two antennas for a next OFDM symbol period after passage of the one OFDM symbol period)* and said first preamble to said second transmit antenna during a subsequent time interval *(Claim 7, Suh teaches generating the second preamble sequence in which the even data of the preamble sequence becomes null data and the odd data of the preamble sequence becomes data, the second preamble sequence being adapted to be*

transmitted via the first of the two antennas for the next OFDM symbol period), except for wherein at least one of said first preamble and said second preamble employs undivided training sequence.

However, in same art, Suh teaches wherein at least one of said first preamble and said second preamble employs undivided training sequence (Paragraphs 0062-0070).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the above teaching of Suh, in order to provide both increased robustness and capacity.

Suh also fails to teach first and second receivers, associated with said first and second transmitters, that employ first and second receive antennas, respectively.

However, in related art Li teaches first and second receivers, associated with said first and second transmitters, that employ first and second receive antennas, respectively (Col 4, lines 11-25 and Figure 1, elements 140 and 150).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the teaching of first and second receivers, associated with said first and second transmitters, that employ first and second receive antennas, respectively, as taught by Li, in the Suh device in order to transmit and receive signal.

(10) Response to Argument

1. Applicant's arguments with respect to claims 1-24 have been fully considered but

they are not persuasive.

(A)   Appellants stated in pages 7-8 that the Examiner has rejected claims 1-3,5-6,9-

11,13-14,17-19, and 21-22 under 35 U.S.C. 112, first paragraph, as failing to comply

with the written description requirement and the claim(s) contains subject matter which

was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had

possession of the claimed invention. More specifically, the Examiner asserts that,

regarding claims 1,9, and 17, there is no mention of " wherein at least one of said first

preamble and said second preamble employs a complete or an undivided training

sequence". Regarding claims 2-3,5-6,10-11,18-19, and 21-22, there is no mention of

"complete or undivided training sequence". The Appellants respectfully disagree with

the Examiner because in paragraph 26 of the original specification stated:

> In one embodiment of the present invention, a training sequence (i.e., and IEEE 802.11 (a) long sequence)
> is employed as the first preamble to the first transmit antenna T1, and a null is employed as the second preamble to
> the second transmit antenna T2, wherein the preambles occur during the initial time interval. Then, the first and
> second preambles are interchanged between the first and second transmit antennas T 1, T2 for concurrent
> transmission during the subsequent time interval. *(See paragraph 26.)*

Wherein an IEEE 802.11(a) long sequence is a complete or undivided training

sequence (Pages 7-9 of the Appellant's argument).

In response to the argument (A), the examiner respectfully disagrees with the

Appellant's argument because IEEE 802.11(a) long sequence can be odd or even

sequence where odd or even sequence is not considered as a complete training

sequence since Appellants didn't specifically state clearly in the specification that the long sequence is a complete or undivided training sequence. Appellants amended the above claims (1-3,5-6,9-11,13-14,17-19, and 21-22) on 04/24/2007 in order to overcome the prior art, Suh et al. (US Pub. No. 2004/0136464). Based on Appellants remark filed on 04/24/2007, Appellants argued that Suh does not teach wherein at least one of a first preamble and second preamble employs a complete training sequence. Instead, Suh discloses dividing a training sequence into even data (in a first preamble sequence) and odd data (in a second preamble sequence) for transmission by two different antennas. The Examiner disagrees because in paragraph 0076, Suh teaches the preamble sequence is classified into a long preamble sequence and a short preamble sequence. In the long preamble sequence, a length-64 sequence is repeated 4 times and a length-128........., so Suh's long preamble sequence can be odd or even or can be complete training sequence since Suh did not stated clearly.

Claims 1 and 9

(B)   The Appellants argued that Suh does not teach or suggest further providing a second preamble to a first transmit antenna and a first preamble to a second transmit antenna during a subsequent time interval (Page 9 of the appellant's argument).

        In response to the argument (B), the examiner respectfully disagrees with the appellant's argument. In claim 7, last paragraph, Suh teaches generating the first preamble sequence in which odd data of the preamble sequence becomes null data

and even data of the preamble sequence becomes data, <u>the first preamble sequence being adapted to be transmitted via the second of the two antennas for a next OFDM symbol period after passage of the one OFDM symbol period</u>, and generating the second preamble sequence in which the even data of the preamble sequence becomes null data and the odd data of the preamble sequence becomes data, <u>the second preamble sequence being adapted to be transmitted via the first of the two antennas for the next OFDM symbol period.</u> Underlining parts teach all the above claimed limitations that Appellants are claiming.

Claims 2 and 10

(C)　　The Appellants argued that Suh does not teach or suggest the first preamble employs a complete training sequence and the second preamble employs a null (Page 10 of the appellant's argument).

In response to the argument (C), the examiner respectfully disagrees with the appellant's argument. In paragraphs 0062-0070, especially paragraph 0065, Suh teaches a preamble sequence generator 517 generates a preamble sequence under the control of a controller (not shown), and provides the generated preamble sequence to a selector 519. In paragraph 0076, Suh teaches the preamble sequence is classified into a long preamble sequence and a short preamble sequence. In the long preamble sequence (complete training sequence), a length-64 sequence is repeated 4 times and a length-128 sequence is repeated 2 times, and in the light of a characteristic of the

OFDM communication system. In claim 7, second and third paragraphs recite a first preamble sequence in which odd data of the preamble sequence become <u>null data</u> and even data of the preamble sequence <u>becomes data</u>.

Claims 3 and 11

(D)   The Appellants argued that Suh does not teach or suggest that the complete training sequence occurs during the null (Page 11 of the appellant's argument).

In response to the argument (D), the examiner respectfully disagrees with the appellant's argument. In paragraphs 0062-0070, especially paragraph 0065, Suh teaches a preamble sequence generator 517 generates a preamble sequence under the control of a controller (not shown), and provides the generated preamble sequence to a selector 519. In paragraph 0076, Suh teaches the preamble sequence is classified into a long preamble sequence and a short preamble sequence. In the long preamble sequence (complete training sequence), a length-64 sequence is repeated 4 times and a length-128 sequence is repeated 2 times, and in the light of a characteristic of the OFDM communication system. In claim 7, second and third paragraphs recite a first preamble sequence in which odd data of the preamble sequence become <u>null data</u> and even data of the preamble sequence <u>becomes data</u>.

Claims 7 and 15

(E)   The Appellants argued that Suh does not teach or suggest that the generator
wherein at least one of said first and second preambles employs a guard interval
(Pages 11-12 of the appellant's argument).

     In response to the argument (E), the examiner respectfully disagrees with the
appellant's argument. In paragraph 0010, Suh teaches a guard interval is inserted. The
guard interval is used to insert null data for a predetermined period same as wherein at
least one of said first and second preambles employs a guard interval. Also see
paragraphs 0013,0078, and 0087.

Claims 8 and 16

(F)   The Appellants argued that Suh does not teach the generator wherein said initial
and subsequent time intervals are contiguous (Pages 11-12 of the appellant's
argument).

     In response to the argument (F), the examiner respectfully disagrees with the
appellant's argument. In claim 7, Suh teaches (i) generating a first preamble sequence
in which odd data of the preamble sequence becomes null data and even data of the
preamble sequence becomes data, <u>the first preamble sequence being adapted to be
transmitted via the first of the two antennas for one OFDM symbol period</u>, and
generating a second preamble sequence in which the even data of the preamble
sequence becomes null data and the odd data of the preamble sequence becomes

data, <u>the second preamble sequence being adapted to be transmitted via the second of</u>

<u>the two antennas for the one OFDM symbol period</u> and

(ii) generating the first preamble sequence in which odd data of the preamble

sequence becomes null data and even data of the preamble sequence becomes data,

<u>the first preamble sequence being adapted to be transmitted via the second of the two</u>

<u>antennas for a next OFDM symbol period after passage of the one OFDM symbol</u>

<u>period</u>, and generating the second preamble sequence in which the even data of the

preamble sequence becomes null data and the odd data of the preamble sequence

becomes data, <u>the second preamble sequence being adapted to be transmitted via the</u>

<u>first of the two antennas for the next OFDM symbol period,</u> so the initial time intervals

for part (i), and subsequent time intervals for part (ii) are contiguous.

<u>Claims 4 and 12</u>

(G)   Appellants argued that the combination of Suh and Nakao do not teach or

suggest that the null is selected from a group consisting of a null sequence, a zero

function, and an un-modulated transmission (Pages 12-13 of the appellant's argument).

   In response to the argument (G), the examiner respectfully disagrees with the

appellant's argument. In Suh, paragraphs 0037 and 0078, teaches the generator

wherein said null is selected from the group consisting of: a null sequence; a zero

function and Nakao, paragraph 0011 teaches the generator wherein said null is selected

from the group consisting of: an un-modulated transmission.

<u>Claim 17</u>

(H)   Appellants argued that Suh does not teach a second preamble to a first transmit

antenna and a first preamble to a second transmit antenna during a subsequent time

interval and Li does not cure the above-noted deficiencies of Suh (Pages 13-14 of the

appellant's argument).

   In response to the argument (H), the examiner respectfully disagrees with the

appellant's argument. In claim 7, last paragraph, Suh teaches generating the first

preamble sequence in which odd data of the preamble sequence becomes null data

and even data of the preamble sequence becomes data, <u>the first preamble sequence</u>

<u>being adapted to be transmitted via the second of the two antennas for a next OFDM</u>

<u>symbol period after passage of the one OFDM symbol period</u>, and generating the

second preamble sequence in which the even data of the preamble sequence becomes

null data and the odd data of the preamble sequence becomes data, <u>the second</u>

<u>preamble sequence being adapted to be transmitted via the first of the two antennas for</u>

<u>the next OFDM symbol period.</u> Underlining parts teach all the above claimed limitations

that Appellants are claiming. In Suh, figure 5 has RF processors 527 and 539 transmit

signal through antenna and Li, figure 1, has more than 2 transmitters and receivers to

transmit and receive signal.

<u>Claims 5,13, and 21</u>

(I)   Appellants argued that Suh and Li does not teach or suggest wherein the first

preamble employs a complete training and the second preamble employs a complete

second training sequence orthogonal to the complete first training sequence (Page 14

of the Appellant's argument).

        In response to the argument (I), the examiner respectfully disagrees with the

appellant's argument. As best understood in 112 1st, Appellant's original specification,

paragraph 0026, Appellants disclosed that "an IEEE 802.11 (a) long sequence is a

complete or undivided training sequence. In Li, Claim 10 and paragraphs 0062-0072,

especially claim 10, Li teaches the MIMO preamble comprises first and second long

training sequences (a complete training sequence) separated by a signal field, the

second long training symbol block comprising a first training sequence (a complete

training sequence) associated with a first antenna and a second training sequence (a

complete training sequence) associated with a second antenna, the first and second

training sequences being orthogonal with respect to one another.

Claims 6,14, and 22

(J)   Appellants argued that Li does not teach the generator wherein said complete

first training sequence employs a subset of tones or subcarrier and said complete

second training sequence employs a remaining subset of tones or subcarrier (Page 15

of the Appellant's argument).

In response to the argument (J), the examiner respectfully disagrees with the appellant's argument. In Appellants specification, tones is same as subcarrier and as best understood by 112 1st, complete first same as long training sequence (Claim 10 and paragraphs 0062-0072) employs a subset of tones or subcarrier and second training sequence same as long training sequence (Claim 10 and paragraphs 0062-0072) employs a remaining subset of tones or subcarrier (Col 5, lines 18-38 and Col 9, line 66-col 10, line 16).

Claims 18-19 and 23-24

For claims 18-19, see the argument of claims 2 and 3 and claims 23-24, see the argument of claims 7 and 8.

Claims 20

For claims 20, see the argument of claims 4 and 12.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Dominic E Rego/

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